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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/785,944	02/16/2001	Martin E. Fermann	IMRAA.015C1	7227

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EXAMINER	
FLORES RUIZ, DELMA R	
ART UNIT	**PAPER NUMBER**
2828	

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/785,944	FERMANN, MARTIN E.	
	Examiner	Art Unit	
	Delma R. Flores Ruiz	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50, 55 - 58* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-14,16-19,22-50 and 55-58* is/are rejected.

7)☒ Claim(s) *8 – 11, 15, 20, and 21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11/21/05
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 – 7, 12 – 14, 16 – 19, 22 – 50, and 55 - 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fermann et al (5,627,848) in view of Wyatt et al (5,422,897).

Regarding claims 1, Fermann et al disclose a laser for generating ultra-short optical pulses (Fig. 1, 4 – 8), comprising: a cavity which repeatedly passes light energy along a cavity axis; a pump (see Fig. 1 Character 103) for exciting said gain medium, the multi-mode optical fiber doped with a gain medium and positioned along said cavity axis (see Fig. 1 Character 104) . Fermann discloses the claimed invention except for multimode optical fiber. It would have been obvious at the time of applicant's invention, to combine Wyatt of teaching a multimode fiber with laser because use a multimode pump source to produce a substantially monomode output is the Polaroid type optical fiber available form the Polaroid Corp. (Column 1, Lines 67 – 68 and Column 2, Lines 1

– 2). Multimode optical fiber has many transmission mode or guided wave modes in which optical energy travels in the fiber (Column 6, Lines 62 – 64).

Regarding claim 2 and 56, Fermann disclose a laser for generating ultra-short optical pulses wherein said mode-locking mechanism comprises a passive mode-locking element (Fig. 1, and Column 3, lines 13 – 26).

Regarding claim 3, Fermann discloses a laser for generating ultra-short optical pulses wherein said passive mode locking element comprises a saturable absorber (abstract, Column 3, lines 13 – 26, Column 5, lines 61 – 63).

Regarding claims 4, 45, Fermann discloses a laser for generating ultra-short optical pulses wherein said saturable absorber comprises InGaAsP (Column 5, lines 61 – 63).

Regarding claims 5, 6, Fermann discloses a power limiter for protecting said saturable absorber and a power limiter comprises a two photon absorber(Figs. 1, 4, 6 and 8, character 118).

Regarding claim 7, Fermann discloses a laser for generating ultra-short optical pulses wherein said optical guide comprises a single-mode mode-filter (see Fig. 5

Character 201) fiber on said cavity axis and the single-mode mode filter fiber is tapered at said fusion splice (Column 7, lines 28 – 43 and Column 8, lines 11 – 22).

Regarding claims 12, Fermann discloses a pump (see Fig. 1 Character 103) is coupled to said multi mode fiber along said cavity (see Fig. 1).

Regarding claim 13 - 14, Fermann discloses a pump (see Fig. 1, Character 103) is coupled to side of said multimode fiber; additionally comprising an optical coupler for coupling said pump to said multimode fiber (see Fig. 1).

Regarding claim 16, Fermann discloses a laser for generating ultra-short optical pulses, additionally comprising a polarization beam splitter (see Fig. 1 Character 117, abstract, Column 5, lines 10 – 23) for outputting said ultra-short optical pulses from said laser.

Regarding claim 17, Fermann discloses a laser for generating ultra-short optical pulses, wherein said cavity comprises a pair of reflectors (see Fig. 1 Character 102, 106) at its opposite ends.

Regarding claim 18, Fermann discloses a laser for generating ultra-short optical pulses, wherein one of said pair of reflectors (see Fig. 1, 4, 5, Character 302, 102, 106,

Column 7, lines 55 – 67 and Column 8, lines 1 – 22) is partially reflecting and provides the output for said cavity.

Regarding claim 19, Fermann discloses a laser for generating ultra-short optical pulses, wherein said mode locking mechanism comprises a saturable absorber, and wherein one of said reflectors is formed on a surface of said saturable absorber (Column 7, lines 55 – 67 and Column 8, lines 1 – 59).

Regarding claim 22, Fermann disclose a laser for generating ultra-short optical pulses, additionally comprising a linear phase drift compensator on said cavity axis (Fig. 1, 4 – 8 and Column 5, lines 10 – 23).

Regarding claim 23, Fermann discloses a laser for generating ultra-short optical pulses wherein said linear phase drift compensator comprises a Faraday rotator (113 or 114, Fig. 8, and Column 1, lines 49 – 56 and Column 5, lines 10 - 23).

Regarding claim 24, Fermann discloses a laser for generating ultra-short optical pulses, wherein said linear phase drift compensator comprises a pair of Faraday rotators(113, 114, Fig. 8, and Column 1, lines 49 – 56 and Column 5, lines 10 – 23).

Regarding claim 25, Fermann discloses a laser for generating ultra-short optical pulses additionally comprising a linear polarization transformer on said cavity axis (see Fig. 1, Character 117, abstract, Column 5, lines 10 – 23 and Column 7, lines 55 – 67).

Regarding claim 26, Fermann discloses a laser for generating ultra-short optical pulses, wherein said linear polarization transformer comprises a wave plate (Fig. 8 Column 5, lines 10 – 23 and Column 6, lines 7 – 16).

Regarding claim 27, Fermann discloses a laser for generating ultra-short optical pulses, wherein said mode locking mechanism comprises an active mode-locking element (Fig. 6).

Regarding claim 28, Fermann discloses a laser for generating ultra-short optical pulses, wherein said active mode locking element comprises an optical amplitude modulator (301 or 302 in Fig. 6, Column 7, lines 44 – 54 and Column 8, lines 6 – 22).

Regarding claim 29, Fermann discloses a laser for generating ultra-short optical pulses, wherein said active mode locking element comprises an optical frequency modulator (301 or 302 in Fig. 6 and Column 7, lines 44 – 54).

Regarding claim 30, Fermann discloses a laser for generating ultra-short optical pulses, wherein said ultra-short optical pulses preferentially in the fundamental mode of said multi-mode optical fiber have a pulse width below 500 psec (Column 2, lines 51 – 67).

Regarding claim 31, Fermann discloses a laser for generating ultra-short optical pulses, additionally comprising an environmental stabilizer on said cavity axis to assure that said cavity remains environmentally stable (Column 7, lines 55 – 67 and Column 8, lines 1 – 22).

Regarding claim 32, Fermann discloses a laser for generating ultra-short optical pulses, wherein said environmental stabilizer comprises a Faraday rotator (113 or 114, Fig. 8, and Column 1, lines 49 – 56 and Column 5, lines 10 – 23).

Regarding claim 33, Fermann discloses a laser for generating ultra-short optical pulses, wherein said environmental stabilizer comprises a pair of Faraday rotators (113 or 114, Fig. 8, and Column 1, lines 49 – 56 and Column 5, lines 10 – 23).

Regarding claim 34, Fermann discloses a laser for generating ultra-short optical pulses, wherein said optical guide comprises an optical fiber doped with an amplifying medium to provide gain guiding (Column 8, lines 1 – 59).

Regarding claim 35, Fermann discloses a laser for generating ultra-short optical pulses, wherein said amplifying medium is concentrated centrally within a fraction of the core diameter of said optical fiber (Column 4, lines 19 – 40).

Regarding claim 36, Fermann discloses a laser for generating ultra-short optical pulses, wherein said optical guide comprises a single-mode optical fiber on said cavity axis (Fig. 5, 201 and Column 7, lines 20 – 43).

Regarding claim 40, Fermann discloses a laser for generating ultra-short optical pulses, wherein said cavity additionally comprises a positive dispersion element (Fig. 5, and Column 7, lines 20 – 43).

Regarding claim 41, Fermann discloses a laser for generating ultra-short optical pulses, wherein said positive dispersion element comprises a length of single-mode positive dispersion fiber positioned along said cavity axis (Fig. 5, and Column 7, lines 20 – 43).

Regarding claim 42, Fermann discloses a laser for generating ultra-short optical pulses, additionally comprising an output coupler for limiting the light energy at said single-mode positive dispersion fiber to less than 10% of the peak power in said cavity (Fig. 5, and Column 7, lines 20 – 43).

Regarding claims 43 – 44, Fermann discloses a ultra-short optical pulses, additionally comprising a frequency converter for comprising pulses generated by said cavity and said frequency converter comprises a frequency doubler (see Fig. 5),

Regarding claim 46, Fermann discloses a laser for generating ultra-short optical pulses, wherein said mufti-mode fiber includes a core, and wherein said gain medium in said mufti-mode optical fiber is concentrated centrally within the core of said mufti-mode fiber (Fig. 1 and , 4 – 8, and Column 9, lines 19-24).

Regarding claim 47, Fermann discloses a laser for generating ultra-short optical pulses, wherein said mufti-mode optical fiber is polarization-maintaining (Column 5, lines 10 23, and Column 8, lines 32 – 49).

Regarding claims 48 and 49, Fermann discloses a laser for generating ultra-short optical pulses, wherein said polarization maintaining multi-mode fiber has an elliptical core and polarization maintaining multi-mode fiber comprises stress-producing region (Column 4, Lines 20 – 40).

Regarding claim 50, Fermann discloses a laser for generating ultra-short optical pulses, wherein said cavity additionally comprises a fiber grating (see Fig. 1 Character

105) written onto said mufti-mode fiber, said grating (see Fig. 1 Character 105) primarily reflecting the fundamental mode of said mufti-mode fiber.

Regarding claim 55, 57, Fermann discloses a method of generating ultra short optical pulse comprising, circulating light energy within a laser cavity amplifying said light energy within said laser cavity in a multimode fiber and confining said light energy within said laser cavity substantially to the fundamental mode of said multimode fiber. One of ordinary skill in the art would have recognized that the method as claimed is implicitly stated over the description of the apparatus (claim1) disclosed above. A monomode or single mode fiber with the same Fundamental mode ((897') abstract).

Regarding claim 58, Fermann discloses a mode locked laser for generating high power ultra short optical pulses (Fig. 1, 4 – 8), comprising; means for pumping (see Fig. 1, Character 103) optical fiber and means for confining the optical energy amplified by said fiber to substantially the fundamental mode A monomode or single mode fiber with the same Fundamental mode ((897') abstract). Fermann discloses the claimed invention except for multimode optical fiber. It would have been obvious at the time of applicant's invention, to combine Wyatt of teaching a multimode fiber with laser because use a multimode pump source to produce a substantially monomode output is the Polaroid type optical fiber available form the Polaroid Corp. (Column 1, Lines 67 – 68 and

Column 2, Lines 1 – 2). Multimode optical fiber has many transmission mode or guided wave modes in which optical energy travels in the fiber (Column 6, Lines 62 – 64).

Allowable Subject Matter

Claims 8 – 11, 20, 15, and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 02/07/2005 have been fully considered but they are not persuasive. Applicant's arguments with respect to claims 1 – 50, and 55 - 58 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Delma R. Flores Ruiz whose telephone number is (571) 272-1940. The examiner can normally be reached on M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Sun Harvey can be reached on (571) -272-1835. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Delma R. Flores Ruiz
Examiner
Art Unit 2828
Drfr/MH
May 13, 2005

Min Sun Harvey
Supervisor Patent Examiner
Art Unit 2828